STEREO RECEIVER

SX-939

OPERATING INSTRUCTIONS

F
FP
GN

PIONEER®

LINE VOLTAGE AND FUSE AND REAR PANEL

Each design of LINE VOLTAGE and FUSE of this model differs according to each destination to be delivered.
How to operate the SX-939 is quite the same for each version. However, each rear panel differs according to LINE VOLTAGE and FUSE designed for each version.
Fig. A shows the LINE VOLTAGE of a 220V only model.
Fig. B shows the LINE VOLTAGE and FUSE of a 5 line voltage (110V, 120V, 130V, 220V, 240V) whose line voltage and fuse can be changed and set as follows:
The Line VOLTAGE of a 120V only model is illustrated Connection Diagram.

220V model

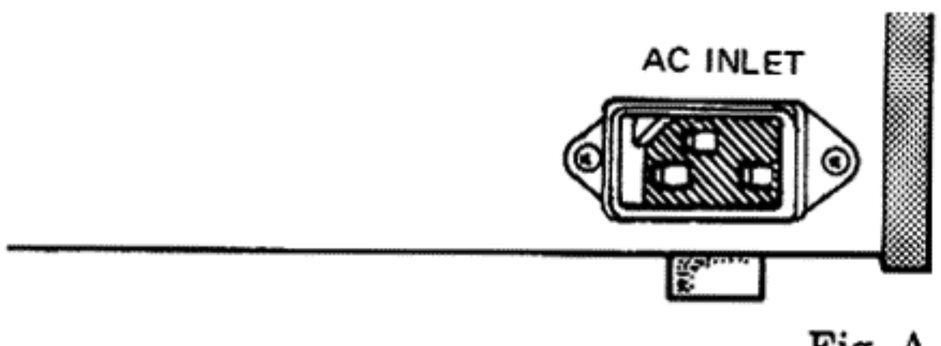

Fig. A

5 Line Voltage model

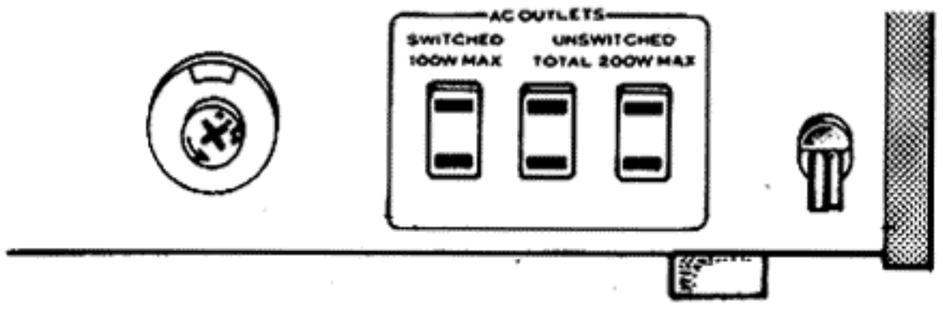

Fig. B

CHANGING LINE VOLTAGE SETTING AND FUSE

To remove the fuse, turn the fuse cap located on the line voltage selector in the direction indicated by the arrow. Then remove the fuse plug from the unit. Put the fuse plug back so that the proper line voltage marking can be seen through the cut in the edge of the plug. Whenever the position of the selector is changed, check the rating of the fuse. A 3A fuse is to be used for either 220V or 240V operation and a 6A rating for 110V, 120V or 130V operation. If the rating of the fuse is correct, replace cap.

FUSE REPLACEMENT

When the fuse blows, remove the fuse cap and replace the fuse with a new one. Fig. C.

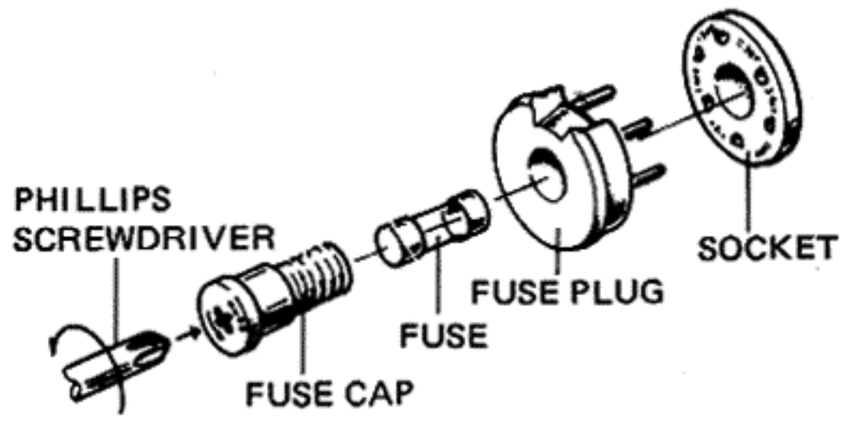

Fig. C

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SX-939 FEATURES

FM Front End With Dual-Gate FET's, Buffer Amp

FM tuner's sensitivity, overload resistance (ability to receive very strong signals without distortion), image rejection and spurious rejection are determined chiefly by the front end. In the SX-939, latest components and circuit technology have been employed to bring all these values close to their theoretical limits: two dual-gate MOS FET's. RF amplification, and the inclusion of a buffer amplifier between local oscillator and mixer stage. In all performance characteristics, the SX-939's FM tuner compares favorably with the world's most advanced specialized tuners.

It hardly needs to be mentioned that the FM dial is of course divided into equal "linear" intervals and that dual tuning meters – signal strength meter and zero-center meter – are provided for easy, precise tuning.

Ceramic Filters And IC's In IF Stages For Sharp Selectivity

A total of three ceramic filters in the IF (intermediate frequency) stages give sharp selectivity and never need to be realigned. Integrated circuits functioning as limiters provide stable operation and excellent capture ratio (the ability to distinguish between a wanted and an unwanted signal on the same station band).

Quadrature Detection, Phase Lock Loop (PLL) Stereo Demodulator

Detection of the frequency-modulated signal is performed by the "quadrature" method with a balanced-bridge type differential amp. This costly design assures linearity throughout the frequency band and reduces distortion to the minimum. In the MPX circuit, a phase-lock-loop (PLL) circuit design is used to give clear, stable separation at any audio frequency. The circuit is equipped with an IC (replacing six transistors) in a bridge configuration.

IC Mean Great AM Listening, Too

This section also incorporates integrated circuits and automatic gain control in the RF and IF stages, as well as a 3-ganged variable capacitors for improved image ratio, selectivity and frequency response, plus reduced distortion.

Balanced Positive And Negative Power Supply With Heavy-Duty Components

The power supply unit – backbone of any amplifier – is of the most elaborate type such as used anywhere in home-use audio equipment, with balanced dual, polarity supply and extre large10,000μF capacitors. This results in a tremendous reserve of power for transient peaks, but also eliminates the irritating switching noise often encountered in less professional designs.

Phono Equalizer With Wide Dynamic Range And Extremely Close Tolerances

The incoming phono signal from a turntable is equalized precisely according to the international RIAA standard playback curve – within 0.3 dB of the ideal. Moreover, the phono inputs can accept relatively strong signal levels without distortion (250mV rms), resulting in a wide dynamic range. This is due to the circuit design with three direct-coupled amplification stages including a differential amp in the first stage.

Twin Tone Controls Permit Precise "Shaping" Of Sound

The overall frequency response curve can be controlled in a total of seven ways. Twin controls in the bass range permit variation at 100Hz by ±10dB in 2dB steps, and at 50Hz by ±5dB in 2.5dB steps; similarly, the high controls give ±10dB correction in 2dB steps at 10kHz, and again ±5dB correction at 20kHz in 2.5dB steps. All tone controls can be removed from the circuit (by setting the TONE swtich at OFF) if desired. High and Low filters are provided for solving specific noise problems, while the Loudness switch boosts the very low and high frequencies at soft listening volumes, giving a more natural sound contour. In one word: the SX-939 gives you complete mastery over what you hear.

... Plus A Wealth Of Auxiliary Features And Circuits

Dolby* inputs and outputs permit connection of an outboard Dolby noise reduction unit, for example, to receive Dolby-encoded FM programs.

Two tape monitor circuits allow two tape decks to be used for recording, playback and tape-to-tape duplicating.

Microphone inputs on the front panel let you use the SX-939 as a public address amplifier.

Audio muting switch decreases the volume instantly by 20dB without having to turn back the volume control.

Indicator lamps light up in accordance with the functions used, telling you at a glance what you're hearing and how.

Dimmer switch dims illumination of tuning dial, tuning meters and indicator lamps, leaving only a softly glowing light in the dark.

*The word 'Dolby' is a trademark of Dolby Laboratories Inc.

ESSENTIALS YOU SHOULD KNOW

PLACEMENT OF YOUR SX-939

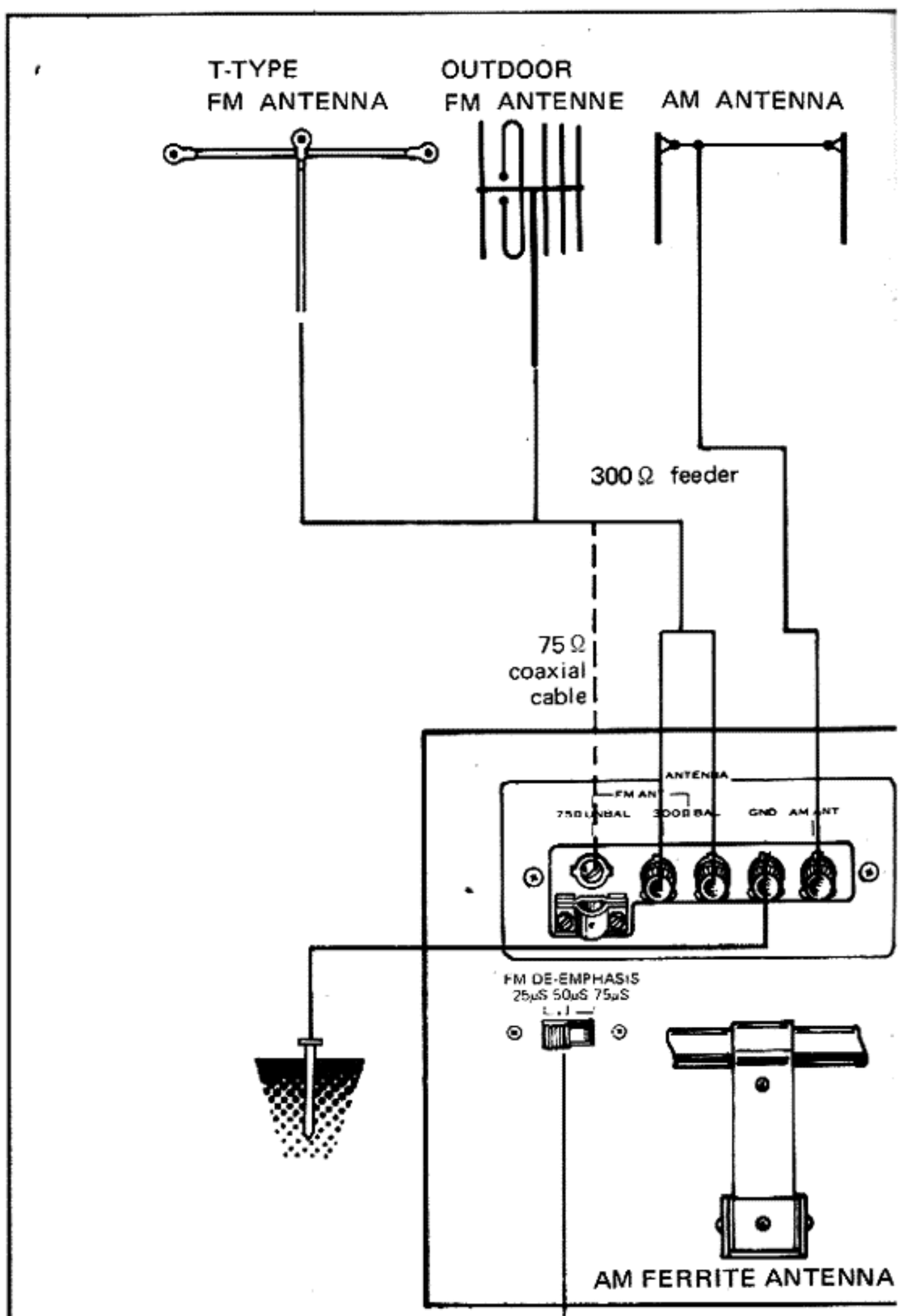
The SX-939 is heavy and should always be handled with great care. Equal care should be given to the choice of its placement within your listening room. Once you have chosen the best position, you can proceed with connection of the speaker systems and turntable. Be sure to avoid the following locations, which can cause malfunctions:

- Places exposed to direct sunlight or close to heating units or other sources of heat.
- Places with poor ventilation.
- Excessively humid or dusty locations.
- Sloping locations, those subject to vibration, or otherwise unstable.
- Places close to alcohol and spray-type insecticides, etc., or any other such highly inflammable substances.

PROTECTION CIRCUIT

For some 3 to 6 seconds after the receiver is switched ON, no sound will be heard. This is due to the operation of protection circuits which are designed to guard transistors and speakers from possible damage due chiefly to the switching transients, etc. Should the receiver remain silent for considerably longer than this, first switch off, and then check the speaker system connections. Should the receiver suddenly go silent while you are listening to it, if you can hear a continuous series of "clicks" due to relay contacts opening and closing within the receiver, this can be an indication of a short circuit in the speaker system connections. Switch off, and re-check the speaker system impedances, etc.
The protection circuit re-sets itself automatically, so that normal functioning is resumed as soon as the cause is removed.

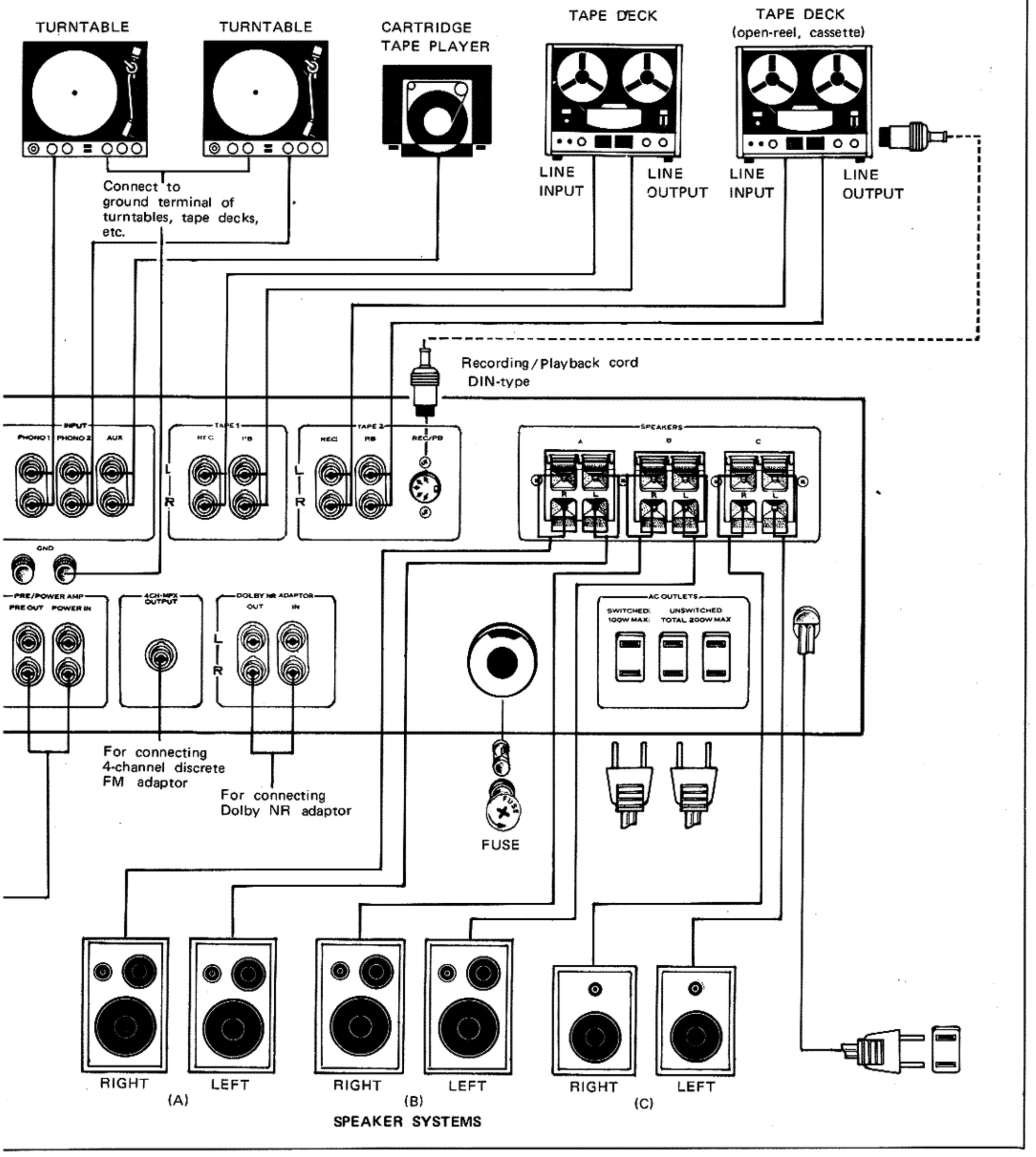
CONNECTION DIAGRAM



FM DE-EMPHASIS SWITCH (5 LINE VOLTAGE MODEL ONLY)
Before shipment this switch has been pre-set to the appropriate position for the delivery area. Models for the U.S.A. and Canada are set to "75μsec" and other models are set to "50μsec".
Incorrect setting will adversely affect the high sound range, so check the position before operating this unit. If you are in doubt about the pre-emphasis used in your area, consult your audio dealer.
NOTE: Be sure to set the switch to "25μsec" only when receiving a special FM Dolby* broadcast (pre-emphasis 25μsec) with an auxiliary Dolby* NR adaptor connected to your system.

PRE/POWER AMP
The bridge/connecting plugs between PRE OUT and POWER IN jacks should always be left in position in normal use. If they are disconnected or removed, no sound will come from the speakers.
Always be sure to cut the power supply before attempting to remove them.
As for the applications of the PRE OUT and POWER IN jacks, please refer to the section on PRE OUT AND POWER IN JACKS on page 9.

* The word "Dolby" is a trademark of Dolby Laboratories Inc.


TURNTABLE
TURNTABLE
CARTRIDGE TAPE PLAYER
TAPE DECK
TAPE DECK
(open-reel, cassette)
LINE INPUT
LINE OUTPUT
LINE INPUT
LINE OUTPUT
Connect to ground terminal of turntables, tape decks, etc.
Recording/Playback cord DIN-type
INPUT
PHONO 1
PHONO 2
AUX
TAPE 1
REC
PB
TAPE 2
REC
PB
REC/PB
SPEAKERS
A
B
C
GND
PRE/POWER AMP
PRE OUT
POWER IN
4CH-MPX OUTPUT
DOLBY NR ADAPTOR
OUT
IN
AC OUTLETS
SWITCHED: 100W MAX.
UNSWITCHED TOTAL 200W MAX
For connecting 4-channel discrete FM adaptor
For connecting Dolby NR adaptor
FUSE
RIGHT
LEFT
(A)
RIGHT
LEFT
(B)
RIGHT
LEFT
(C)
SPEAKER SYSTEMS

STEREO SETUP

Your SX-939 receiver is ideally suited to form the heart of a stereophonic reproduction system of the very highest quality. Use it, as shown in Fig. 1, with the speaker systems and other components of your choice, including turntable, tape deck (either open-reel or cassette type), etc. The receiver can also be used as part of the following systems:

- Multi-amplifier systems.
- Dolby system reception, playback, and recording.
- Four-channel playback systems.
- Four-channel FM multiplex reception.

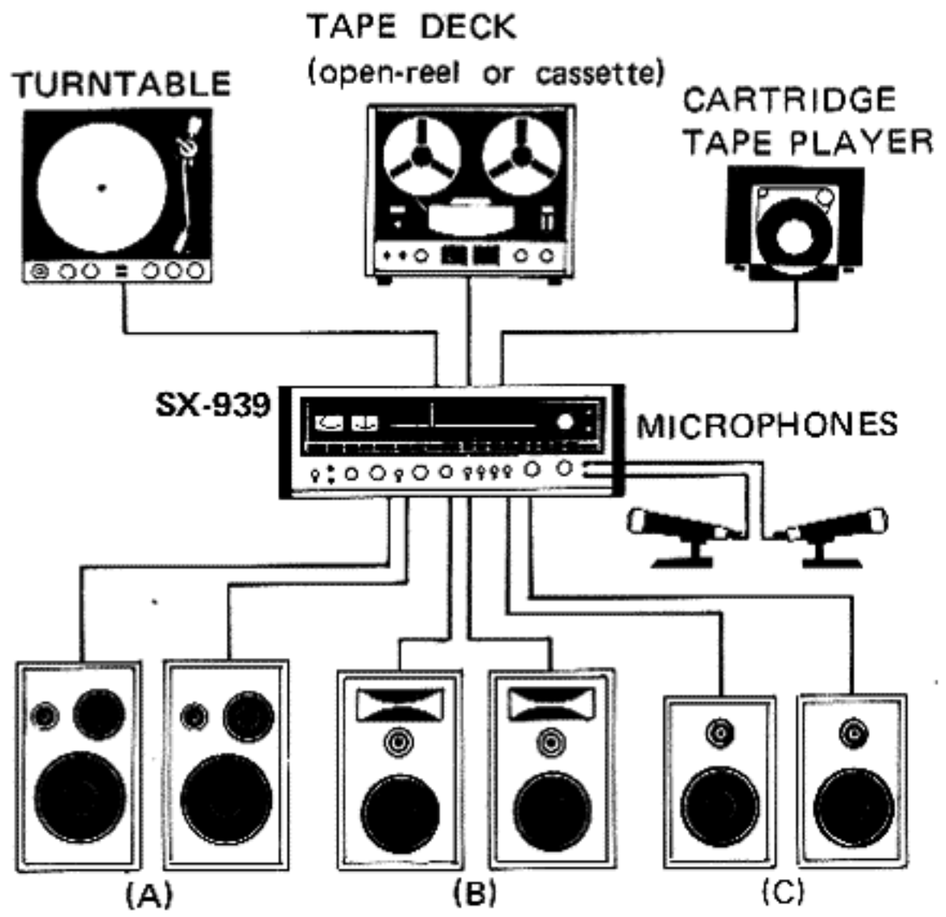


Fig. 1

SPEAKER CONNECTION

The receiver is equipped with three sets of speaker terminals (A, B, and C). Use the A terminals for the speakers in normal use.

As shown in Fig. 2 , connect the terminals marked R to the RH-speaker systems (the speaker which is on the right-hand side as viewed from the listening position), and the terminals marked L to the LH-speaker systems.

- As shown in Fig. 3, the upper socket (red) is the positive (+) terminal, and the lower (black) is the negative (—) terminal in each case.

In the same way, the speakers, too, have positive and negative polarity (+ and — terminals). Be sure to connect terminals of the same polarity together (+ to +, and — to —).

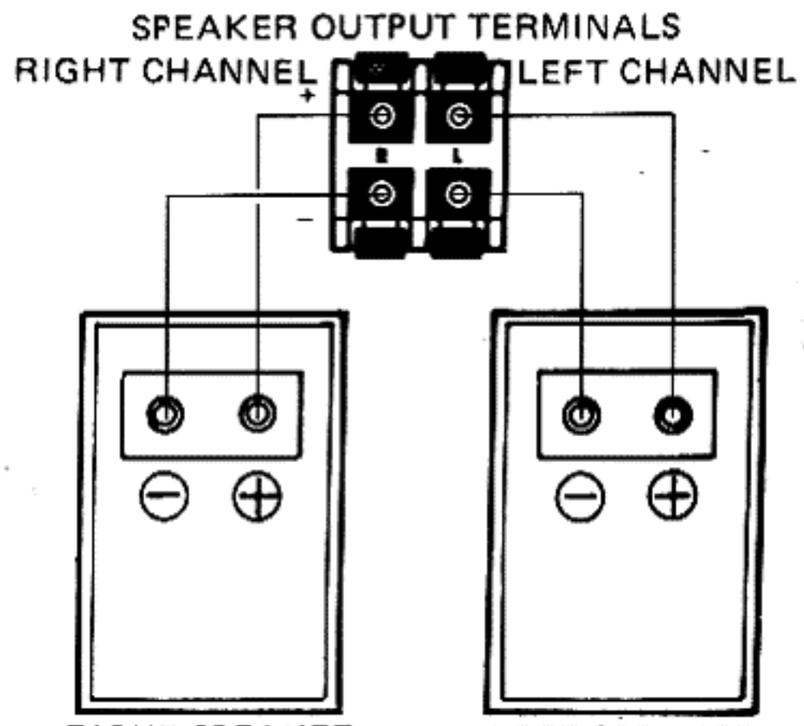


Fig. 2

NOTE:
When two sets of speaker systems are being used at the same time (A+B, A+C, or B+C), please ensure that the impedance of each speaker system is not less than 8 Ω. If speaker systems with impedances below 8 Ω are used, the protection circuit of the receiver may operate to prevent audition.

Speaker Terminal and Lead-Wire Connections

Connecting the leads (see Fig. 3)

1. Depress the black lever on the speaker terminals and insert the lead from the negative (—) side into the lower socket hole, and release the lever.
2. Lift up the red lever on the speaker terminals and insert the lead from the positive (+) side into the upper socket hole, and then release the lever.

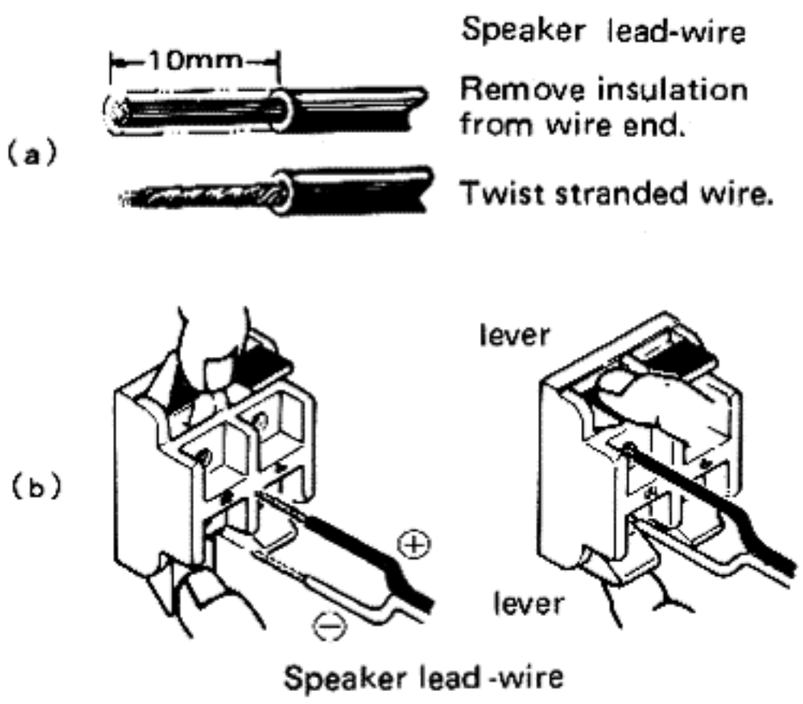


Fig. 3

Speaker Placement

The optimum stereo effect is obtained from a two-channel stereo system when the two speaker systems on the left and on the right are about the same distance apart as they are from the listener, forming the three corners of an equilateral triangle.

ANTENNA AND GROUND CONNECTIONS

FM ANTENNA CONNECTIONS

For the best results you should use an outdoor-type FM antenna. The simple T-type antenna supplied with the receiver may be satisfactorily used in areas of high signal strength (for instance, those very near to the FM station, or in an all-wooden construction house.)

Placement and Connection of FM Antenna

- Connect the feeder wire from the antenna to the FM ANTENNA terminals on the receiver.
- Please place the antenna for the best reception while listening to the FM broadcast station as described in "FM Reception" on page 12.

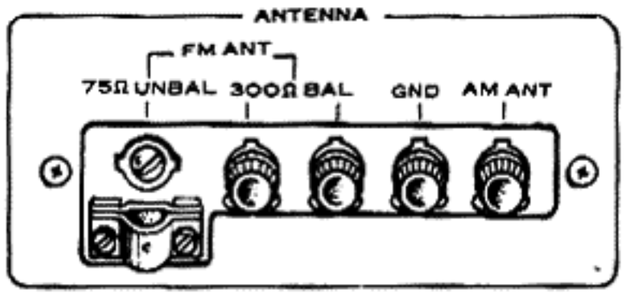


Fig. 4

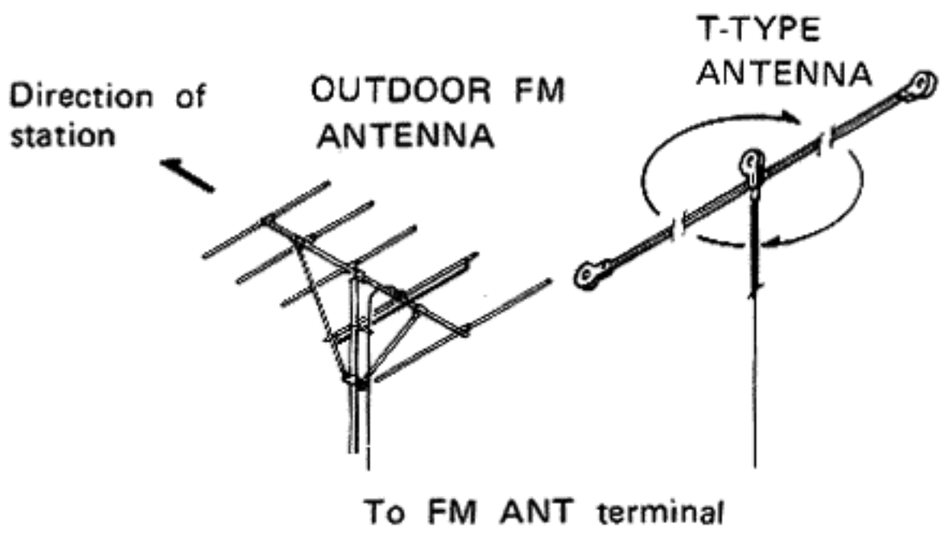


Fig. 5

Making Connections with Coaxial Cable

In certain locations — in cities with high traffic density, in industrial areas, and near high voltage power lines — objectionable interference may be present even with the use of an outdoor FM antenna. Please consult with your local audio dealer on the advisability of connecting the antenna and receiver with 75Ω coaxial cable in place of the feeder you are using. When using coaxial cable, connections should be made as shown in Fig. 6.

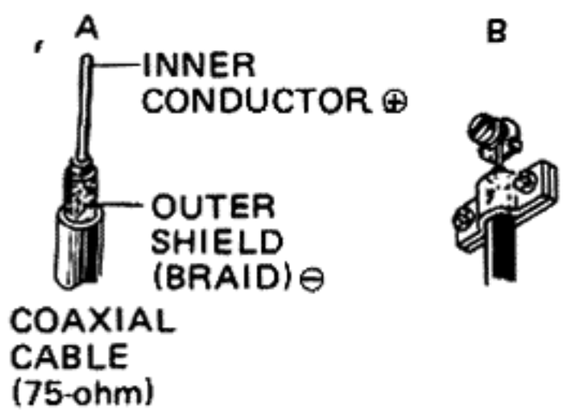

A
INNER CONDUCTOR ⊕
OUTER SHIELD (BRAID) ⊖
COAXIAL CABLE (75-ohm)
B
A) Strip the coaxial cable as shown.
B) Loosen the screws and connect the cable. Then tighten all screws for a connection.

Fig. 6

AM ANTENNA CONNECTIONS

Under normal conditions it will be sufficient to adjust the ferrite bar antenna mounted on the rear panel of the receiver for optimum broadcast signal reception as shown in Fig. 7 and in accordance with the instructions given on page12 "AM Reception."
Should reception still be noisy or week with the bar antenna, an indoor lead antenna or special outdoor AM antenna must be fitted.

Placement and Connection of AM Antenna

- Connect the antenna lead to the receiver AM ANTENNA terminal.
- Use vinyl-sheathed wire as shown in Fig. 7 for the indoor lead antenna.
- For an outdoor AM antenna, use trees, etc., to suspend the vinyl-sheathed wire as shown in Fig. 7.

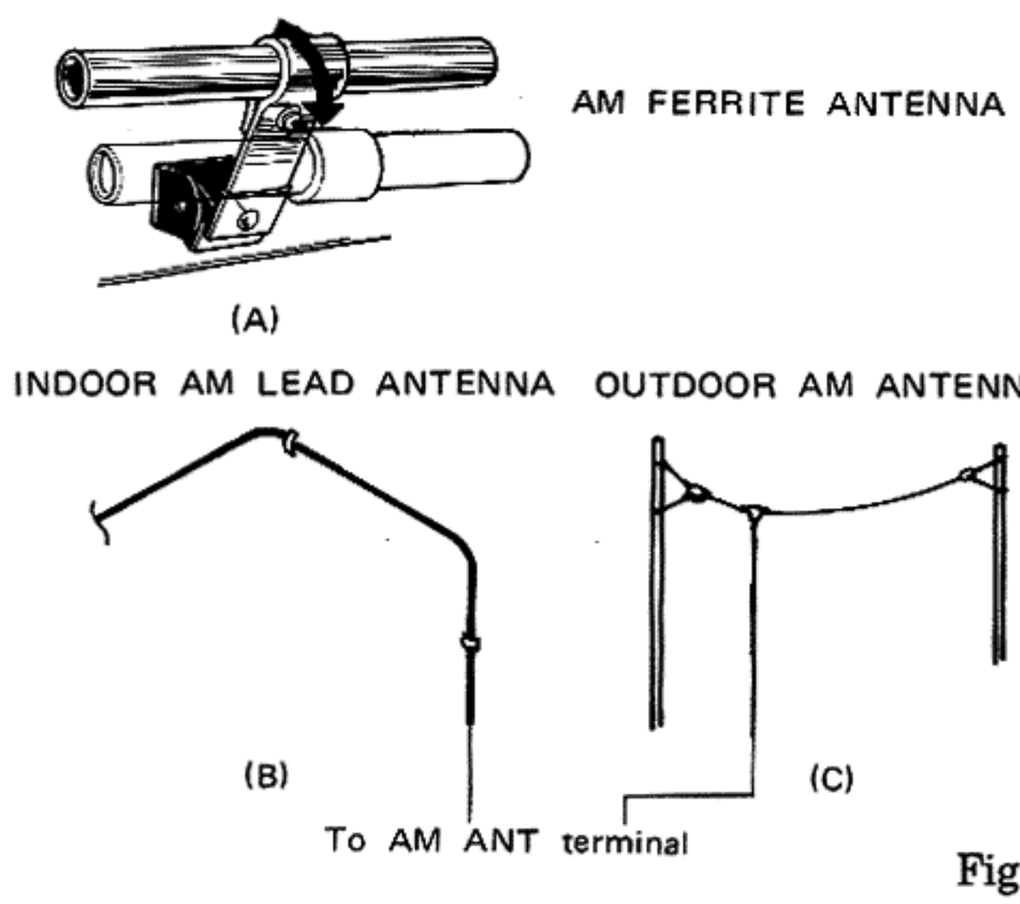


Fig. 7

THE GROUND TERMINAL

It is advisable, both on the grounds of safety and the elimination of interference, to install a ground wire wherever possible.

CONNECTIONS

TURNTABLE CONNECTIONS

The receiver is fitted with two phonograph input jacks, PHONO 1 and PHONO 2, enabling two turntables fitted with magnetic phono cartridges to be connected.

- Connections between the turntable OUTPUT plugs and the receiver PHONO input jacks should be made as shown in Fig. 8, taking care not to confuse L & R channels. If, as in Fig. 8, the turntable is fitted with a ground lead or plug, this should be connected to the receiver GND terminal.

NOTES:

1. *When using a turntable fitted with two tonearms, the output leads for each of the tonearms should be connected to the respective PHONO input jacks (1 and 2).*
2. *When using a turntable fitted with a moving coil (MC) phono cartridge, it is essential to use a special MC matching transformer or head amplifier.*

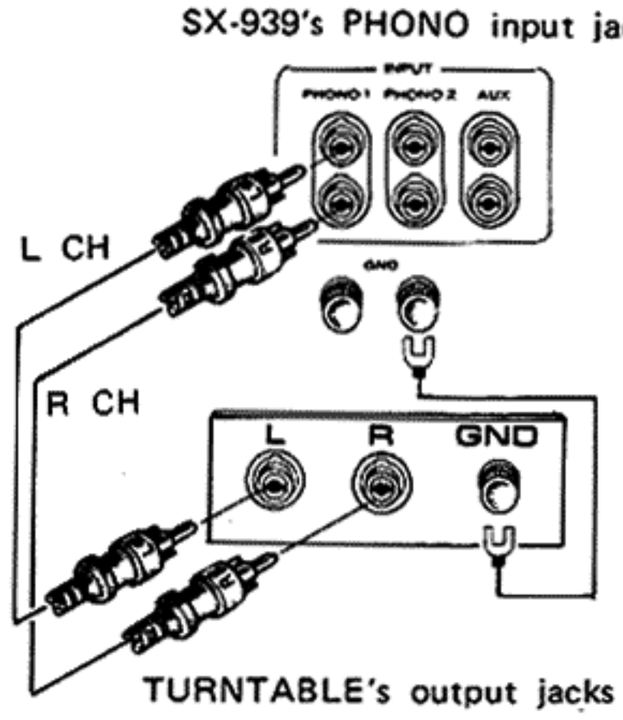


Fig. 8

TAPE DECK CONNECTIONS

The provision of two sets of recording output jacks (TAPE 1, 2 REC) and two sets of playback input jacks (TAPE 1, 2 PB) plus a DIN-type recording/playback connector (TAPE 2 REC/PB) means that, in addition to normal recording and playback, two tape decks can be used to record at the same time, or to "dub" or duplicate recordings from one tape deck to the other. Use the connecting cord(s) provided with the tape deck(s) to make the connections (see Fig. 9).
The tape deck can also be connected to the ADAPTOR jacks (DOLBY NR — noise reduction).

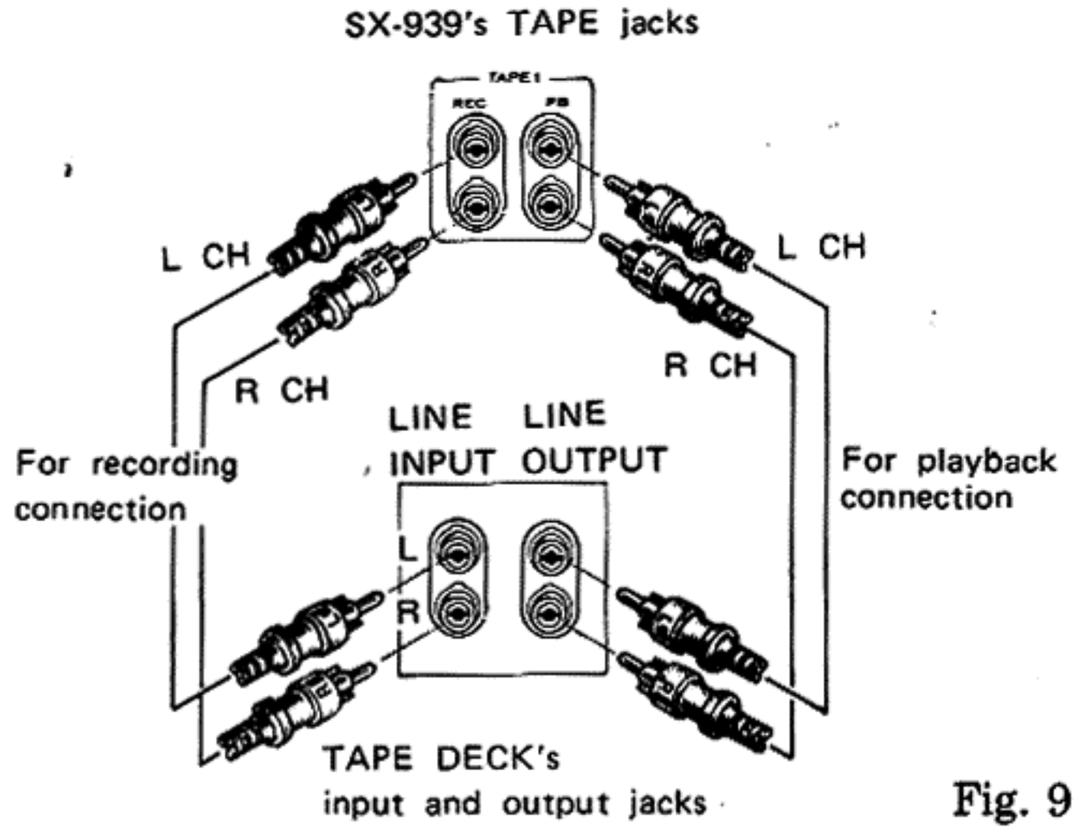


Fig. 9

Connections for Recording

- The receiver output TAPE 1 REC jacks are connected to the recording input jacks (LINE INPUT) of the tape deck as shown in Fig. 9. The upper jacks of each pair are the L (left) channels and the lower are the R (right) channels. When the tape deck is provided with a DIN-type connector for recording and playback, use the optional recording/playback cord (e.g. Pioneer model PP-101) to make the connection with the TAPE 2 REC/PB DIN connector.

NOTE:
If the recording/playback cord connects both recording and playback at the same time, there is no need to make separate connections to either TAPE 2 REC output jacks or TAPE 2 PB input jacks. If the ADAPTOR OUT jacks are to be used, connect them to the tape deck input (LINE INPUT) jacks.

- When using two tape decks, the second tape deck should be connected to the receiver TAPE 2 REC output jacks. If, however, the first deck has been connected to the DIN-type recording/playback connector, the second deck should be connected to the TAPE 1 REC output jacks.

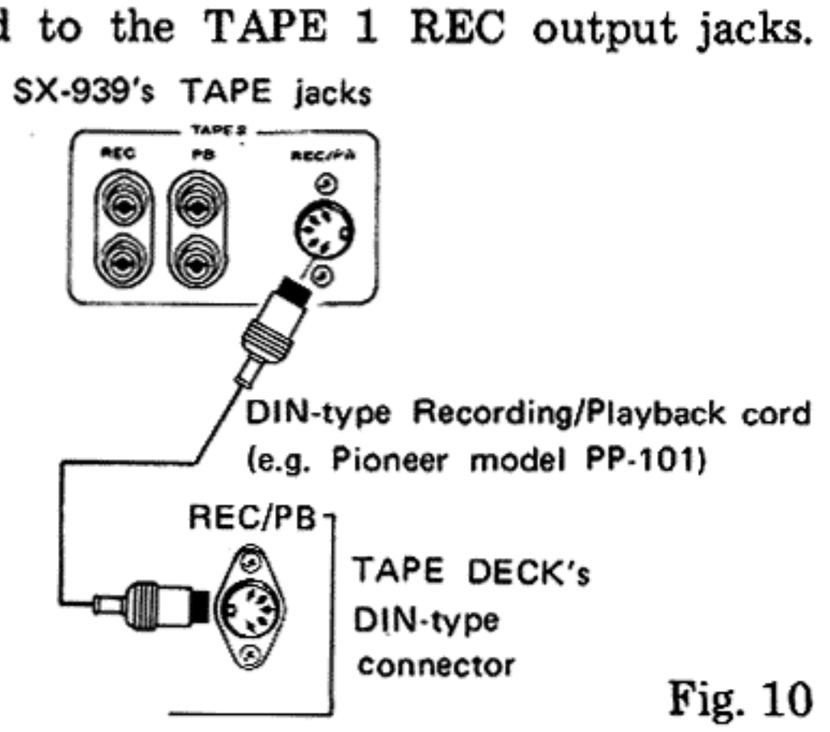


Fig. 10

Connections for Playback

- Connect the receiver TAPE 1 PB input jacks to the playback output jacks (LINE OUTPUT or TAPE MONITOR) on the tape deck. The upper jacks of each pair are the L (left) channels, and the lower are the R (right) channels.

NOTE:
If the ADAPTOR IN jacks are to be used, connect them to the tape deck output (LINE OUTPUT) jacks.

- When using two tape decks, the second tape deck should be connected to the receiver TAPE 2 PB input jacks. If, however, the first deck has been connected to the DIN-type recording/playback connector (TAPE 2 REC/PB), the second deck should be connected to the TAPE 1 PB input jacks.

USE OF THE AUX INPUT JACKS

These jacks are a set of spare input jacks. They can be connected to cartridge tape players, television sound multiplex tuners, or other forms of signal output.
The upper of the two terminals is the L (left) channel, and the lower is the R (right) channel.

USING THE PRE OUT AND POWER IN JACKS

If the connections between the PRE OUT and POWER IN jacks shown in Fig. 11 are removed, the power amplifier and pre-amplifier sections can function separately.
By isolating the receiver pre-amplifier section, it is possible to use it to drive a separate, high output power amplifier or to build up a multi-amplifier system as detailed here.

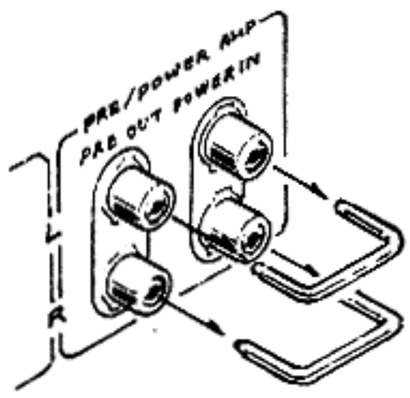


Fig. 11

Connections for Setting up A Multi-amplifier

By purchasing an electronic crossover network and one or two additional power amplifiers, a two- or three-way multi-amplifier system can be set up. The multi-amplifier system splits up the audible frequency range into different frequency bands, operating amplifiers and speakers ideally suited to each band. This results in reduced intermodulation distortion and improved damping and crossover characteristics. Use of the multi-amplifier system enables construction of the ideal playback system.
Connections for a two-way multi-amplifier system are as follows:

1. Remove both of the plugs bridging the PRE OUT and POWER IN jacks.
2. Connect the PRE OUT jacks to the input jacks of the crossover network.
3. Connect the POWER IN jacks to the LOW range jacks of the crossover network.
4. Connect the HIGH range output jacks of the crossover network to the input jacks of a separately bought power amplifier for the high frequency range.
5. Connect the speakers for the lower frequencies to the receiver, and those for the higher frequencies to the separate amplifier.

The levels of the different frequency ranges are adjusted at the crossover network. For detailed instructions on the use of the crossover network, please refer to the instruction manual provided with it.

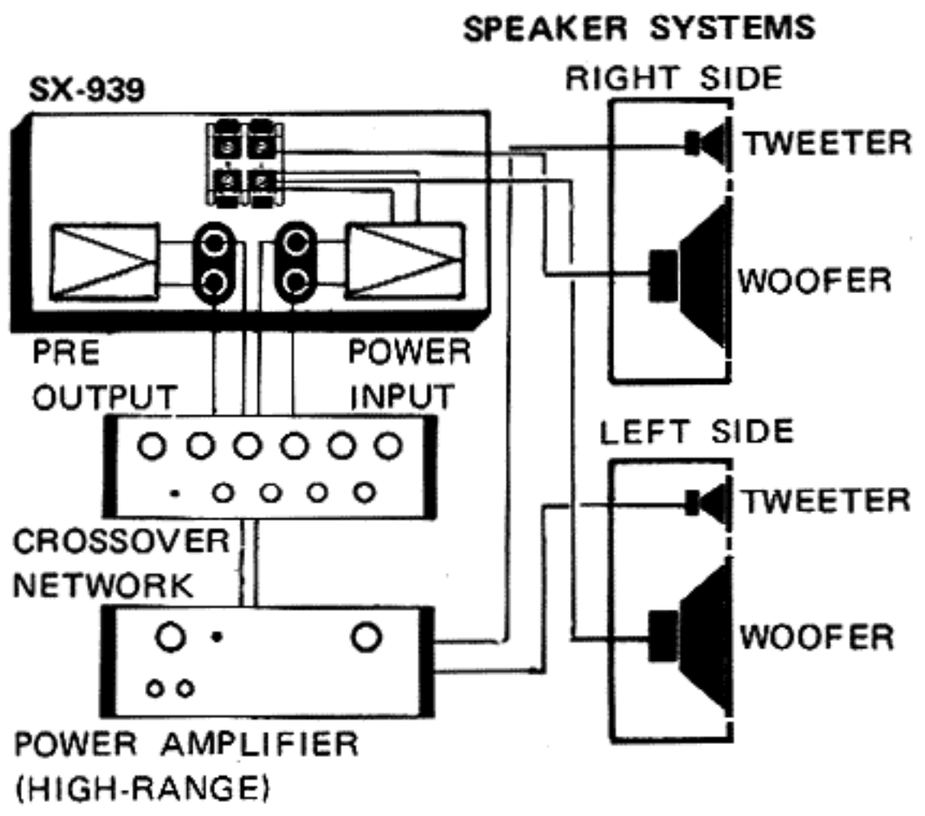


Fig. 12

FRONT PANEL FACILITIES

SPEAKER BUTTONS

Each of speaker systems A, B, and C is connected to each of output terminals A, B, and C.
By pushing the following:

SPKR-A . . . . Speaker systems A into operation
SPKR-B . . . . Speaker systems B into operation
SPKR-C . . . . Speaker systems C into operation

NOTES:

1. *When any two pairs of the buttons (A + B, B + C, C + A) are depressed, the corresponding pairs of speaker systems will come into operation. However, operating all three buttons even though depressed at the same time is not possible.*
2. *Only when listening through headphones, press again the SPKR button(s) in use to OFF (undepressed) from the ON position (pressed).*

POWER SWITCH

Turn this switch ON but wait for some 3 to 6 seconds, during the silence of which the protection circuit eliminates the unpleasant noise not imputed to a receiver fault.
For details, see "PROTECTION CIRCUIT" on page 4.

PHONES (1, 2) OUTPUT JACKS

Accept two pairs of headphones.

BASS CONTROLS

Adjust bass tone quality.

100Hz . . . . . For the low frequencies below 400Hz. Possible up to 10dB of increasing or reducing at 100Hz in 2dB steps.

50Hz . . . . . After adjustment by the 100Hz control, further adjust frequencies below 80Hz by this control, if necessary. Possible up to 5dB of increasing or reducing in bass response at 50Hz in 2.5dB steps.

LOW CUT, HIGH CUT BUTTONS

LOW . . . . . When the low-pitched rumble (turntable motor or other source) is obtrusive, depress the LOW CUT button to ON. In no interference, leave it undepressed (OFF).

HIGH . . . . . When the high frequency scratch noise (records or other source) is much, depress this button to ON. In no interference, leave it undepressed (OFF).

TONE SWITCH

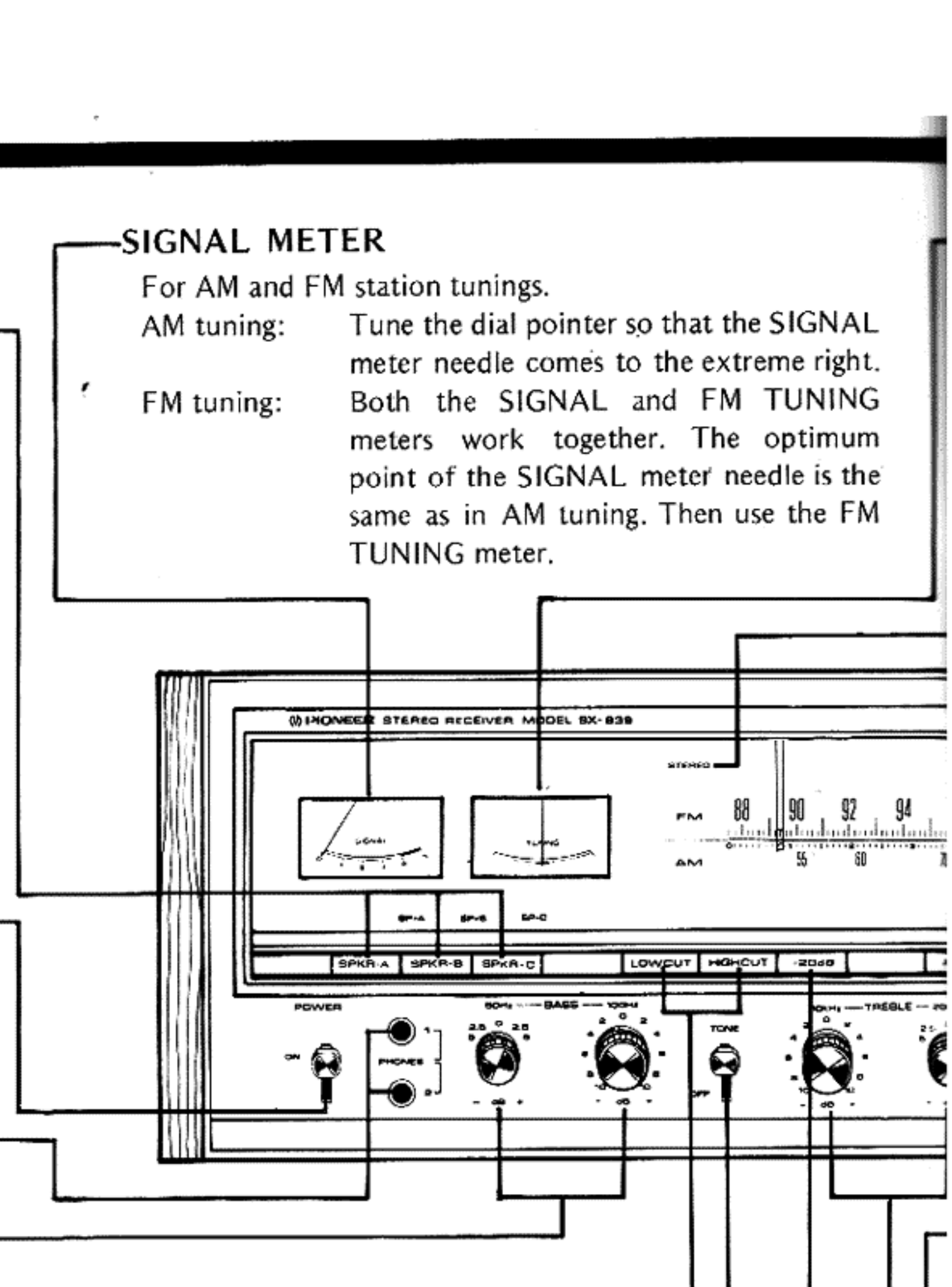
When in the ON (up) position, this switch causes the amplifier section to operate with a flat frequency regardless of the tone control settings. Use this switch to check the audio characteristics of your listening room such as when it is necessary to check the tone quality of phono cartridges and speakers and also to particularly set the tone controls to be assessed.

SIGNAL METER

For AM and FM station tunings.

AM tuning: Tune the dial pointer so that the SIGNAL meter needle comes to the extreme right.

FM tuning: Both the SIGNAL and FM TUNING meters work together. The optimum point of the SIGNAL meter needle is the same as in AM tuning. Then use the FM TUNING meter.



TREBLE CONTROLS

Adjust treble tone quality.

10KHz . . . . . For the high frequencies above 2.5kHz. Possible up to 10dB of increasing or reducing in treble response at 10KHz in 2dB steps.

20KHz . . . . . After adjustment by the 10kHz control, further adjust frequencies above 12kHz by this control, if necessary. Possible up to 5dB of increasing or reducing in treble response at 20kHz in 2.5dB steps.

AUDIO MUTING BUTTON –20dB

Depress this button to mute the audio input to –20dB. No need to turn down the VOLUME control on each occasion for your convenience.

TAPE DUPLICATE SWITCH

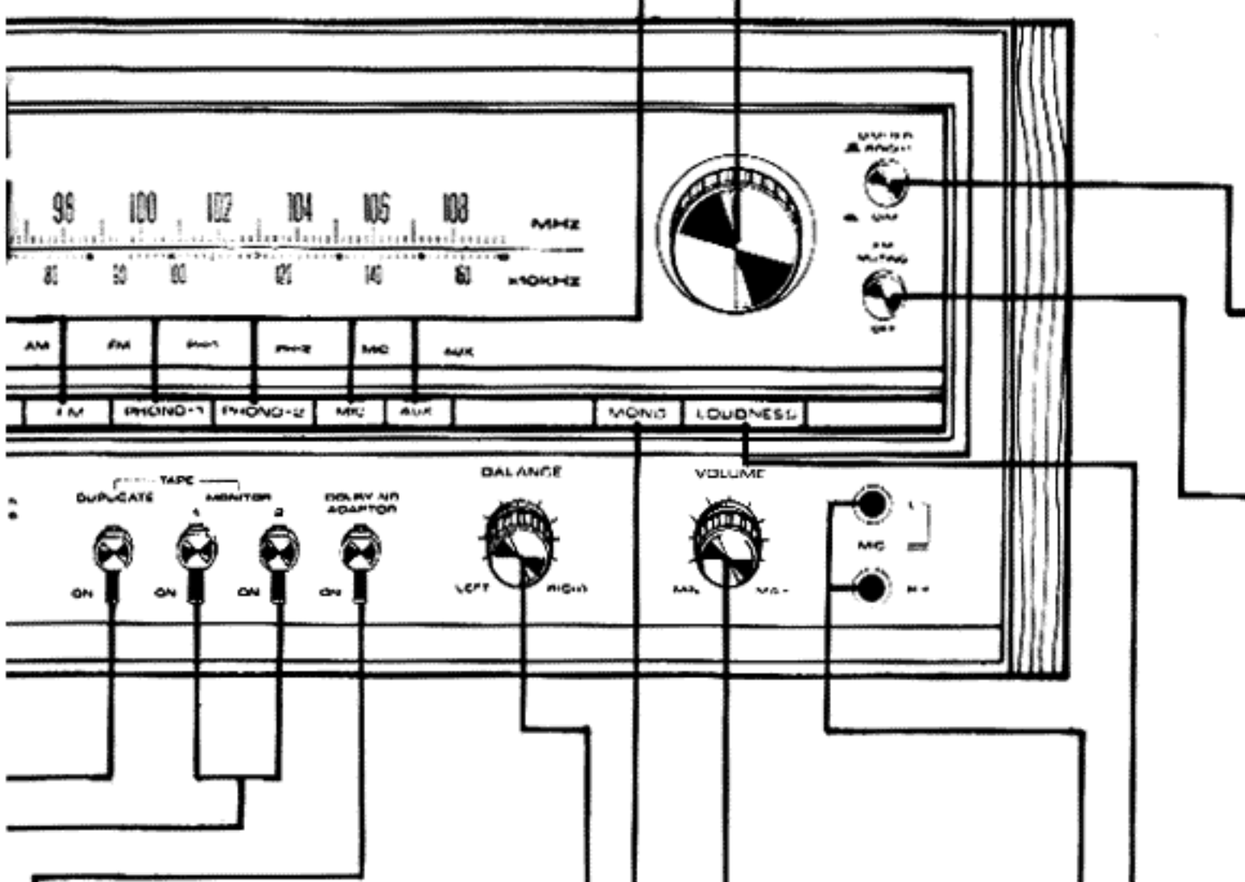
Leave this switch in the ON (down) position to duplicate or edit a recorded tape using two tape decks. For normal use, switch over to the OFF (up) position.

FM TUNING METER

While getting the SIGNAL meter needle going to the right, make fine adjustment with the FM TUNING meter whose needle comes to the center (indicating the optimum reception).

FM STEREO INDICATOR

TUNING KNOB



BALANCE CONTROL

Adjusts the balance between the sound volume from the left and right speaker systems.

TAPE MONITOR (1, 2) SWITCHES

Monitor the recorded sound while recording with a tape deck. Also possible to play back tapes as follows:

1 . . . . . With a tape deck connected to the TAPE 1 jacks (REC and PB), either monitoring of recording in progress or playing back is possible.

2 . . . . . With a tape deck connected to the TAPE 2 jacks (REC and PB or REC/PB connector), the same as in 1 above is possible.

DOLBY NR ADAPTOR SWITCH

When employing Dolby Noise Reduction Adaptor depress this DOLBY NR ADAPTOR to ON.

FUNCTION SELECTOR BUTTONS

For selecting the program source, push each button as follows:

AM, ... For AM broadcast reception.

FM . . . . . For FM broadcast reception. The STEREO indicator lights up when the broadcast is in stereo.

PHONO 1 . . . For operating a turntable connected to the PHONO 1 input jacks.

PHONO 2 . . . For operating a turntable connected to the PHONO 2 input jacks.

MIC . . . . . For using a microphone. Not possible to mix with other program source.

AUX . . . . . For listening to audio equipment (cartridge tape player, TV sound tuner, etc.) connected to the AUX input jacks.

DIMMER SWITCH

Dims the brightness of the indicator light. Press again to restore full brightness.

FM MUTING BUTTON

Leave this button undepressed (in the ON position) while tuning in FM stations. Inter-station noise may interfere with FM reception while tuning between stations. To suppress this noise, leave the MUTING button undepressed (in the ON position). If the low signal strength is due to distance from the transmitter or other influences, depress this button, at which the weak station will be heard with the MUTING "OFF."

LOUDNESS BUTTON

Depress this button to listen at low volume. The human ear's frequency response varies according to the listening volume. The depressed button compensates for hearing response with emphasis on the bass and treble.

MIC INPUT JACKS

L, R . . . . . For connecting the left and right channel microphones.

NOTE:
Use the high impedance (above 20kΩ) with 6mm diam. phone plugs.

VOLUME CONTROL

Governs both the volume of sound outputs from the speaker systems and from the headphones.

MODE BUTTON

Leave this button undepressed (if necessary, depress this to release it when already depressed) for STEREO playback. For MONO playback, depress it. In this case stereo signals for left and right channels will be mixed into mono signal which will be heard from the center of both speaker systems.

HOW TO OPERATE THE RECEIVER

PREPARING TO SWITCH POWER ON

Before switching on the power, please set the various controls as follows:

- Set the VOLUME control to MIN (minimum — fully anticlockwise).
- Set the BALANCE control to the midway position.
- Turn the TAPE and ADAPTOR switches to OFF (UP).
- Set the TREBLE and BASS controls to the midway positions (the "0" positions).
- Turn the TONE switch ON (UP).
- Set the AUDIO MUTING button to OFF (undepressed).
- Set the MODE button to STEREO (released/undepressed).
- Set the FM MUTING button to ON (released/undepressed).

It is important to set these controls as indicated to avoid any inadvertent overload on the receiver or speakers, etc., when power is switched ON.

FM RECEPTION

1. Depress the FM button for FUNCTION selection.
2. Leave (or reset) the FM MUTING button to ON. Note, however, that in areas of low signal strength the signal may be suppressed. In this case only, the FM MUTING button should be depressed to the OFF position.
3. Turn the TUNING knob to select your station. Best reception is obtained when the SIGNAL meter needle deflects to the extreme right, and the TUNING meter needle is exactly in the center, as shown in Fig. 13. If the broadcast is stereophonic, the STEREO indicator lamp will come on: it will not illuminate for monophonic broadcasts.
4. Adjust the loudness of the sound by means of the VOLUME control, and use the BASS and TREBLE controls to give the tone quality you prefer.

AM RECEPTION

1. Depress the AM button for FUNCTION selection.
2. Turn the TUNING knob to select your station. Best reception is obtained when the SIGNAL meter needle deflects to the extreme right (see Fig. 13).
3. Adjust the VOLUME, BASS, and TREBLE controls for the listening level and tone quality of your preference.

NOTE:
If, when listening to either FM or AM reception, the sensitivity seems poor, and interference is heavy, so that listening pleasure is seriously affected, refer to the section "ANTENNA AND GROUND CONNECTIONS," on page 7 and make any changes necessary.

RECORD PLAYING

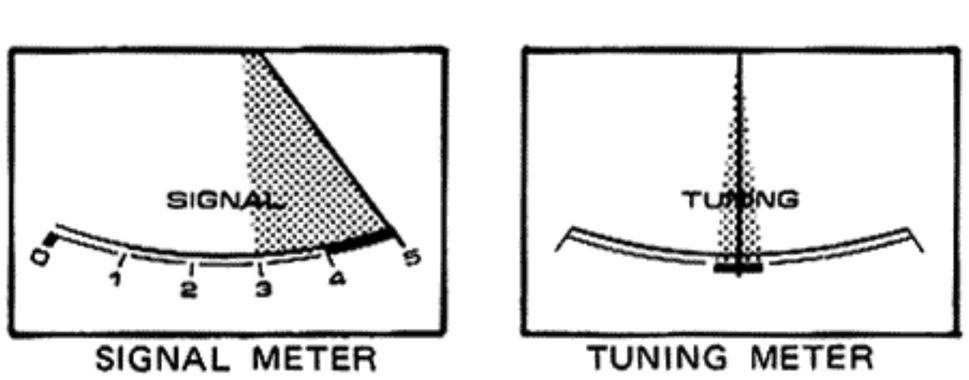
1. Set the FUNCTION selector to either PHONO 1 or PHONO 2, dependent upon whether the turntable you are using is connected to the PHONO 1 or PHONO 2 input jacks, respectively.
2. Operate the turntable to play the record.
3. Adjust the VOLUME, BASS, and TREBLE controls for the listening level and tone quality of your preference.

NOTE:
In order to eliminate the unpleasant noise which can mark the start of playing a record, depress the AUDIO MUTING —20 dB button, releasing it after the stylus has performed the run-in, and then adjusting the VOLUME to give the sound level of your choice.

USING THE AUX JACKS

When playing equipment to which the AUX jacks are connected, operate as follows:

1. Set the FUNCTION selector by depressing the AUX button.
2. Operate the audio equipment.
3. Adjust the VOLUME, BASS, and TREBLE controls for the listening level and tone quality of your preference.



SIGNAL METER (Both for AM and FM Reception)

TUNING METER (Only for FM Reception)

Fig. 13

USING THE MICROPHONES

1. Connect the microphones to the L (left-channel) and R (right-channel) MIC jacks.
2. Set the FUNCTION selector by depressing the MIC button.
3. Set the MODE button to STEREO (released/ undepressed).
4. Adjust the sound level by turning the VOLUME control to the right little by little. The midway setting of the BASS and TREBLE controls will usually be best.

NOTES:

1. *It is readily possible for microphones, under certain conditions of use, to give rise to "howling" feedback noise. Be careful not to raise the volume too high when the microphones are close to the speaker systems or in a room with a great deal of resonance. It is most effective in using the TREBLE and BASS controls at their "0" settings, or in switching the TONE switch ON (UP).*
2. *When a microphone has only been connected to one of the microphone jacks (either L or R), sound will only be heard from the corresponding left-hand or right-hand speaker systems as long as the MODE button is set at STEREO. For the sound to be heard from both speaker systems, the MONO mode should be selected.*

USING TAPE DECKS

Playback

1. According to the TAPE PB (1, 2), DOLBY NR IN jacks to which the tape deck is connected, either the TAPE MONITOR 1 or 2 switches, or the ADAPTOR DOLBY NR switches should be put ON (see Figs. 14 and 15).
2. Operate the tape deck controls to give playback.
3. Adjust the VOLUME, BASS, and TREBLE controls for the listening level and tone quality of your preference.

NOTE:
Turning the TAPE MONITOR switch ON enables tape playback whatever the setting of the FUNCTION selector.

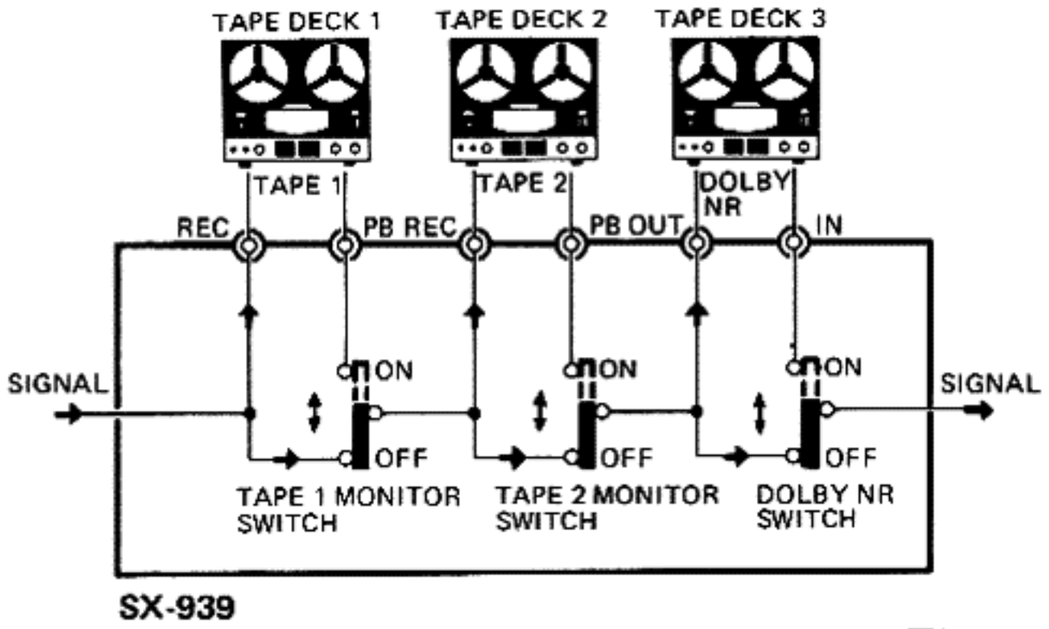


Fig. 14

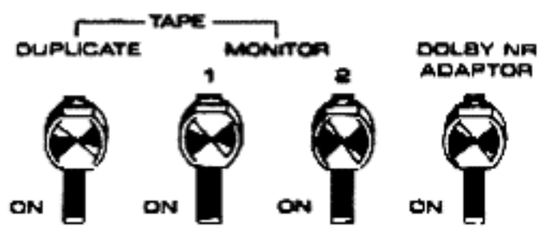


Fig. 15

Recording

As shown in Fig. 16, the receiver TAPE REC (1, 2), DOLBY NR OUT jacks carry a certain, fixed level output from the source selected by the FUNCTION selector, which, once the tape deck is connected to the appropriate jacks, enables the selected source to be recorded. The operation is as follows:

1. Set the FUNCTION selector button for the source to be recorded.
2. Play the selected program source.
3. Adjust the recording level by means of the controls on the tape deck, and commence recording.

NOTE:
The receiver VOLUME, BASS, and TREBLE controls are completely inoperative — that is they have no affection the recorded sound — when recordings are being made.

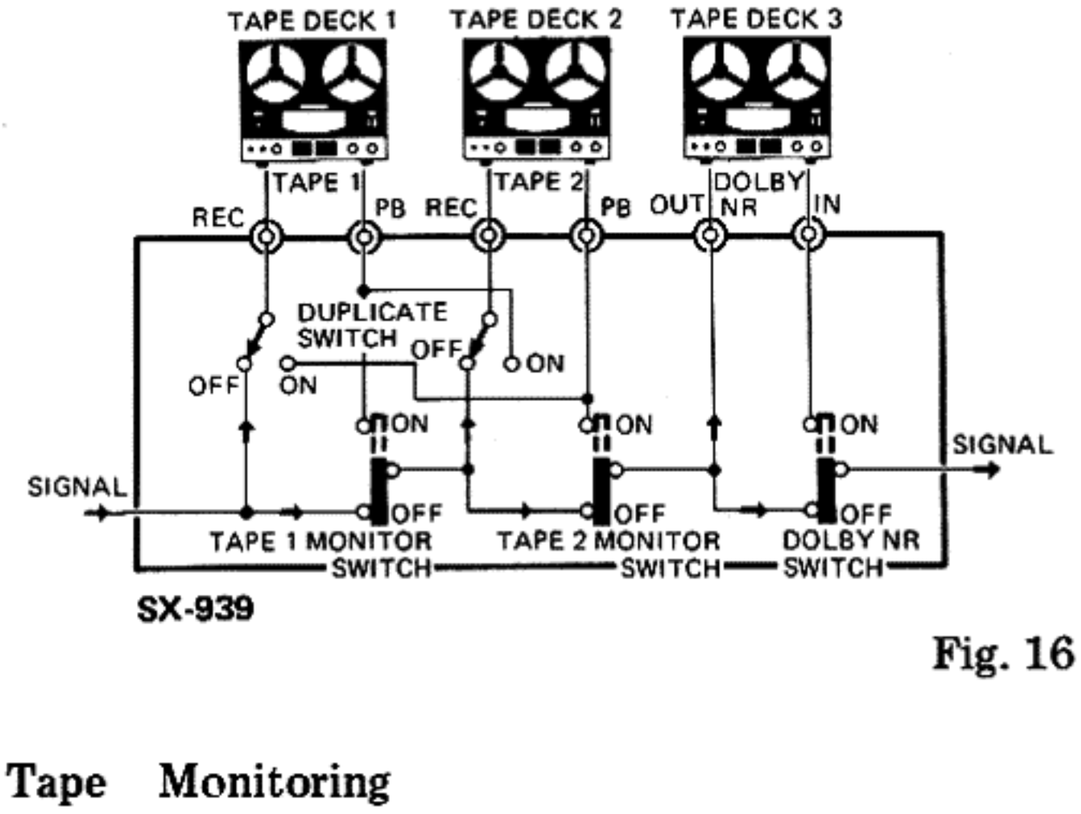


Fig. 16

Tape Monitoring

While a recording is being made with the deck, if the TAPE MONITOR switch is turned ON, the sound being recorded can be monitored through the speaker systems.
In this case, if the tape deck is of three-head type, or if it is equipped with a monitoring capability, both recording and playback connections must be made.

DUPLICATING OR TAPE EDITING RECORDED TAPES

By using two tape decks, a recording of a complete FM broadcast, say, can be first made, and then those items in it which you want for your permanent "tape library" can be selected and re-recorded on another tape.

1. Connect the two tape decks as shown in Fig. 17.
2. Set the TAPE DUPLICATE switch to the ON position.
3. Select one of the tape decks (1 or 2) to play back the pre-recorded tape, and use the other tape deck to make the copy recording.
4. When recording with tape deck 1, TAPE MONITOR switch 1 should be switched ON to monitor the sound being recorded, and when recording with deck 2, TAPE MONITOR switch 2 should be switched ON for monitoring (refer again to Fig. 17).

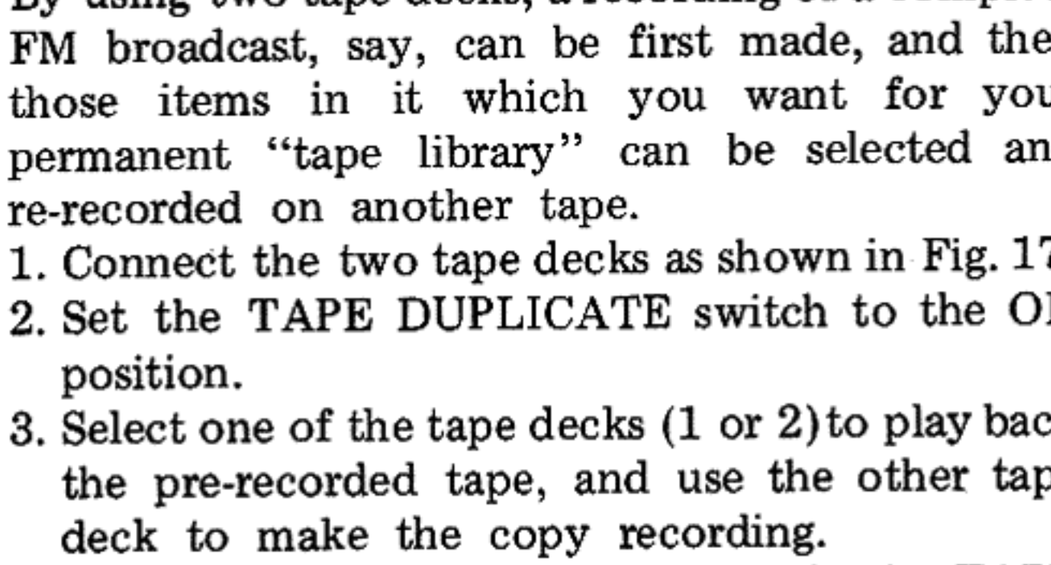


Fig. 17

VERSATILE JACKS FOR TODAY AND TOMORROW

USE OF THE DOLBY NR ADAPTOR JACKS

If a DOLBY adaptor is connected to the receiver DOLBY NR ADAPTOR jacks, not only can FM Dolby broadcasts be played back, but if a tape deck is connected to the adaptor itself, Dolby system recording and playback is possible.

Reception of FM Dolby Broadcasts

Reception and playback of Dolby system FM broadcasts is done with connections made as follows:

1. Connect the Dolby adaptor as shown in Fig. 18 to the DOLBY NR ADAPTOR IN and OUT jacks.
2. Set the FUNCTION selector to FM by depressing the FM button, and tune in to an FM Dolby-system broadcast.
3. Turn the ADAPTOR DOLBY NR switch to ON.

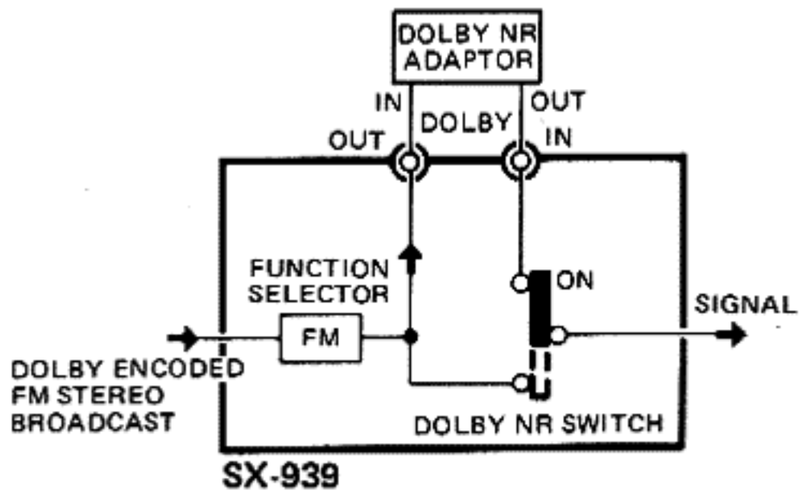


Fig. 18

Dolby System Recording and Playback with Tape Decks Dolby Recording

1. As shown in Fig. 19, connect the Dolby adaptor output jacks to the tape deck recording input jacks (LINE INPUT).
2. Select the program source of your choice with the FUNCTION selector.

Dolby Playback

1. Connect the tape deck playback output jacks (LINE OUTPUT) to the input jacks of the Dolby adaptor.
2. Turn the ADAPTOR DOLBY NR switch to ON, and playback your Dolby-system recordings.

NOTES:

1. *If you monitor the sound being recorded with the Dolby adaptor, turn the ADAPTOR DOLBY NR switch ON.*
2. *For detailed instructions on connections, etc., for your Dolby adaptor, please see the instruction manual provided with it.*

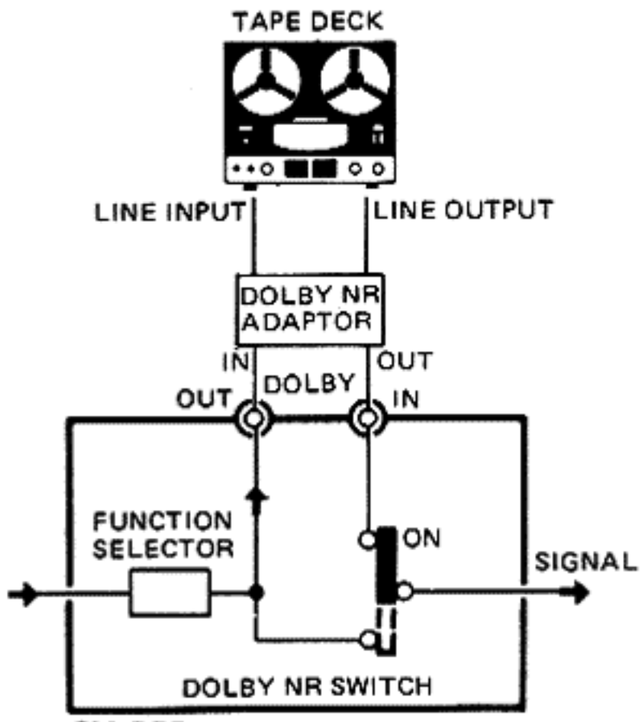


Fig. 19

SETTING UP A 4-CHANNEL SYSTEM

As shown in Fig. 20, a 4-channel system consists of two pairs of left-hand and right-hand speakers, one at the front, and the other at the rear. This gives a whole new dimension of realism not attainable with conventional 2-channel stereo. It offers the sense of the acoustics of the hall — and the atmosphere and applause — where the recording was made.

The unique sense of "presence" of being "actually there" which 4-channel stereo alone can give, has to be experienced before it can be appreciated. The receiver will form the ideal heart of a 4-channel system, but you will also require four speaker systems and a 4-channel decoder/power amplifier ("decoder-amp" below) for the rear channels.

Operation

1. Connect the receiver DOLBY NR ADAPTOR OUT jacks to the decoder-amp INPUT jacks.
2. Connect the receiver DOLBY NR ADAPTOR IN jacks to the decoder-amp OUTPUT jacks.
3. Turn the ADAPTOR switch to ON.
4. You are now ready to enjoy the thrill of 4-channel reproduction.

Placement of Your Speaker Systems

As shown in Fig. 20, two pairs of speaker systems are located to the front left and right, and the rear left and right (four in all). Connect the speakers located in FRONT to the receiver, and the REAR speakers to the power amplifier for the rear channels. It is also possible, according to the restrictions of space or personal taste, to place the speakers as shown in Fig. 22.

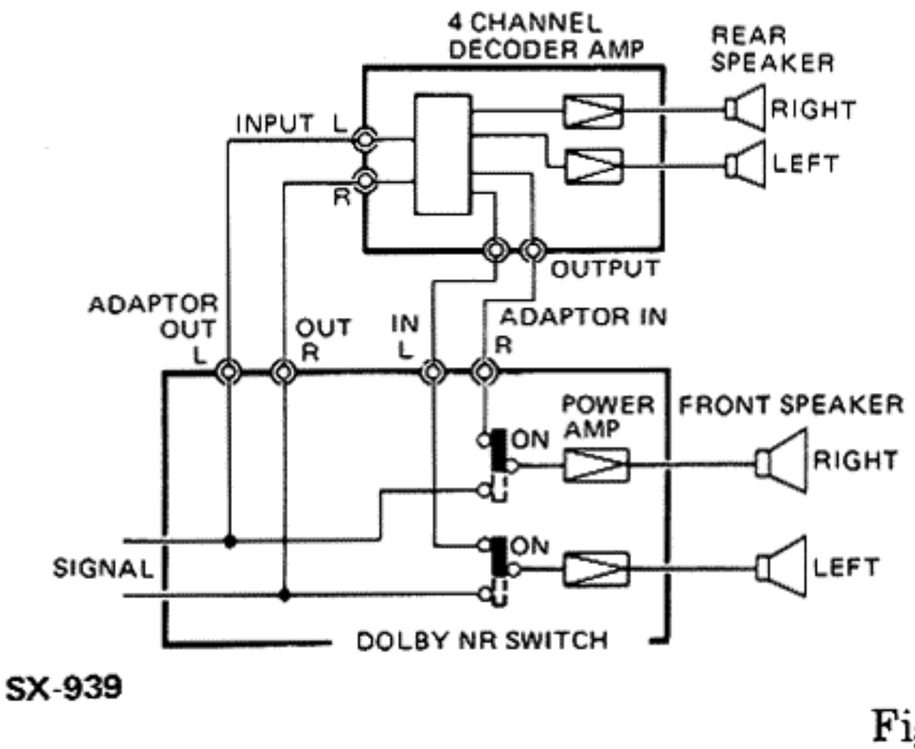


Fig. 20

USE OF THE 4CH MPX OUTPUT JACKS

Whenever 4-channel multiplex discrete FM broadcasts may commence, the addition of a 4-channel discrete FM broadcast adaptor ("adaptor" below) will enable full 4-channel reproduction of the broadcasts from your receiver.

1. The adaptor is connected as shown in Fig. 21 to the 4 CH MPX OUTPUT jack of the receiver.
2. Connect the adaptor output to the receiver DOLBY NR jacks.
3. Turn the ADAPTOR switch ON.
4. Depress the FM button for FUNCTION selection.
5. Tune in to the 4-channel discrete FM broadcast.
6. Adjust the VOLUME, BASS, and TREBLE controls for the listening level and tone quality of your preference.

NOTE:
For detailed instructions on connections, etc., see the instruction manual with the adaptor.

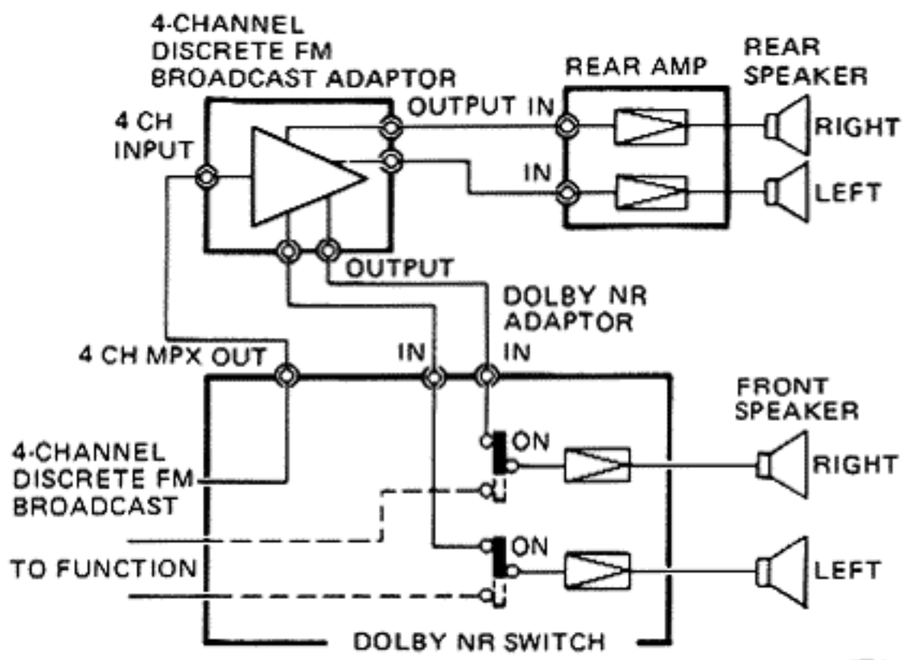


Fig. 21

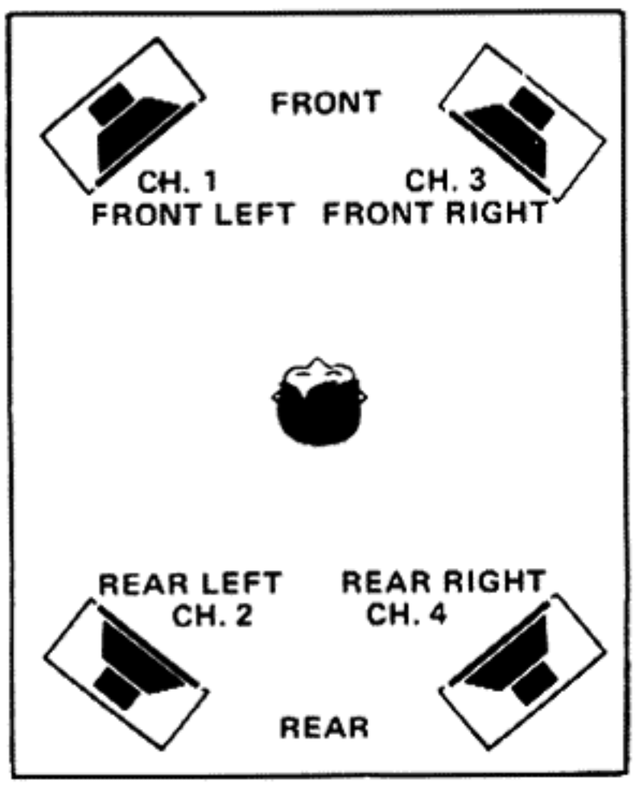


Fig. 22

CONDITIONS FREQUENTLY MISTAKEN FOR MALFUNCTION

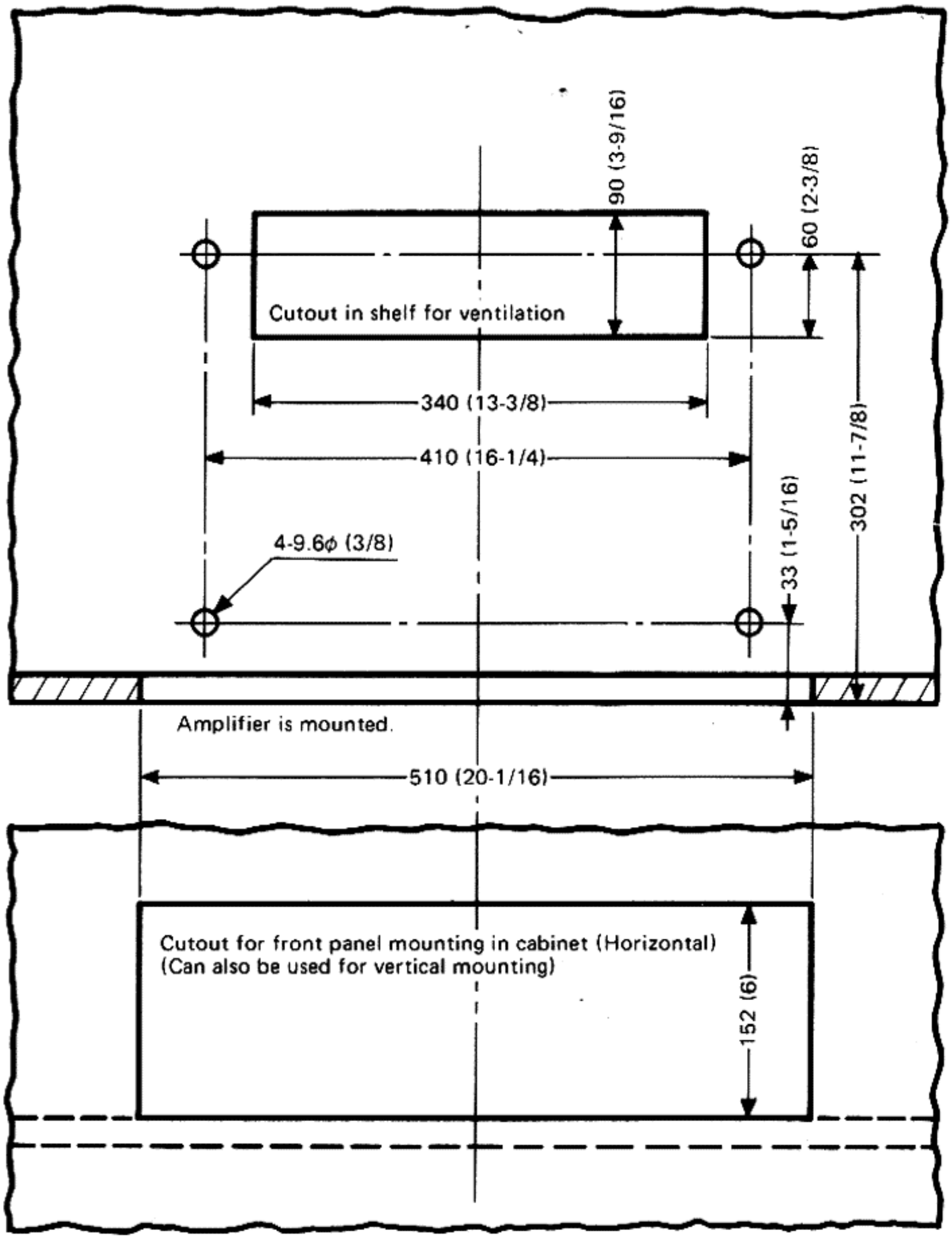
Noise: There are a variety of noises relating to the operation of a hi-fi unit. These are generally divided into two types; (1) the unit is faulty (a transistor or part has deteriorated) and (2) an external source is adding to the unit.
When a hi-fi unit produces an unpleasant noise, it is often assumed that the unit is faulty, but statistical records indicate that the majority of noises produced in hi-fi acoustic units result from external sources of noise: Due to the inherent high sensitivity and the high fidelity in reproduction, the unit amplifies and reproduces extraneous noises, however small, into definite output noise. If your receiver produces a noise, check according to the following table and trace out the source of noise for the appropriate corrective action.

	SYMPTOM	SUSPECTED SOURCE OF NOISE	DIAGNOSIS AND REMEDY
WHEN LISTENING TO BROADCASTS	Continuous or intermittent noise like jjjjjj or zzzzzz.	· Static (lightning) · Fluorescent lamp, motor, or thermostat may be in use in house or in the vicinity of the house.	In many cases, it is very difficult to remove the source of noise. In order to make the radio input larger than the noise level, set up a good outdoor antenna and make a complete grounding.
	When a station is tuned in, hum is mixed in the program.	· Poor fluorescent lamp, motor, or electric heater may be in use in house or near the house.	Reversing the line plug may occasionally alleviate this noise problem. Usually it is very difficult to eliminate the noise.
	Hissing sound noise in AM (medium wave) reception.	· The frequency of an adjacent station is interfering with that of the station being tuned in (10kHz beat interference). · TV set is on in the same house with the receiver.	Impossible to remove such interference. If the case of such noise is in the TV set, increase the distance between the TV set and receiver.
	Static noise (in particular, when automobiles run close to the house).	· White noise generated from automobile engines. · High frequency sewing machine or welding machine being used near your house.	In an area surrounded by hills or high buildings, the FM input signals are very weak. Thus the noise limiter in the circuit loses its function. Set up an FM outdoor antenna having many director elements.
	Reception of FM stereo program contains more noise than FM mono program.	· Note that the service area covered by an FM stereo broadcast is about 50% of that of a regular mono broadcast.	Increasing FM input signal may alleviate this problem. Use an exclusive FM outdoor antenna instead of the indoor T-type antenna.
WHEN PLAYING RECORDS	Hum or buzz. When switched to radio reception, the noise disappears.	· Poor connection of shielded wire. (a) · Jack connection is loose. (b) · Line cord of fluorescent lamp is near the shielded wire. (c) · Poor grounding. (d) · Ham transmitting station or TV transmitting station is near your house. (e)	Correct the conditions stated in (a), (b), (c) or (d). In case of (e), report it to an official activity.
	Output tone quality is poor and mixed with noise. Treble is not clear.	· Stylus wears out. (a) · Record wears out. (b) · Dust adheres to stylus. (c) · Stylus is improperly mounted. (d) · Stylus pressure is not proper. (e) · The TREBLE level is too high.	Check (a) through (e) and correct the condition. Lower the TREBLE level.

WATCH FOR THE FOLLOWING CONDITIONS; THESE ARE ALSO APT TO BE MISTAKEN FOR MALFUNCTIONS.

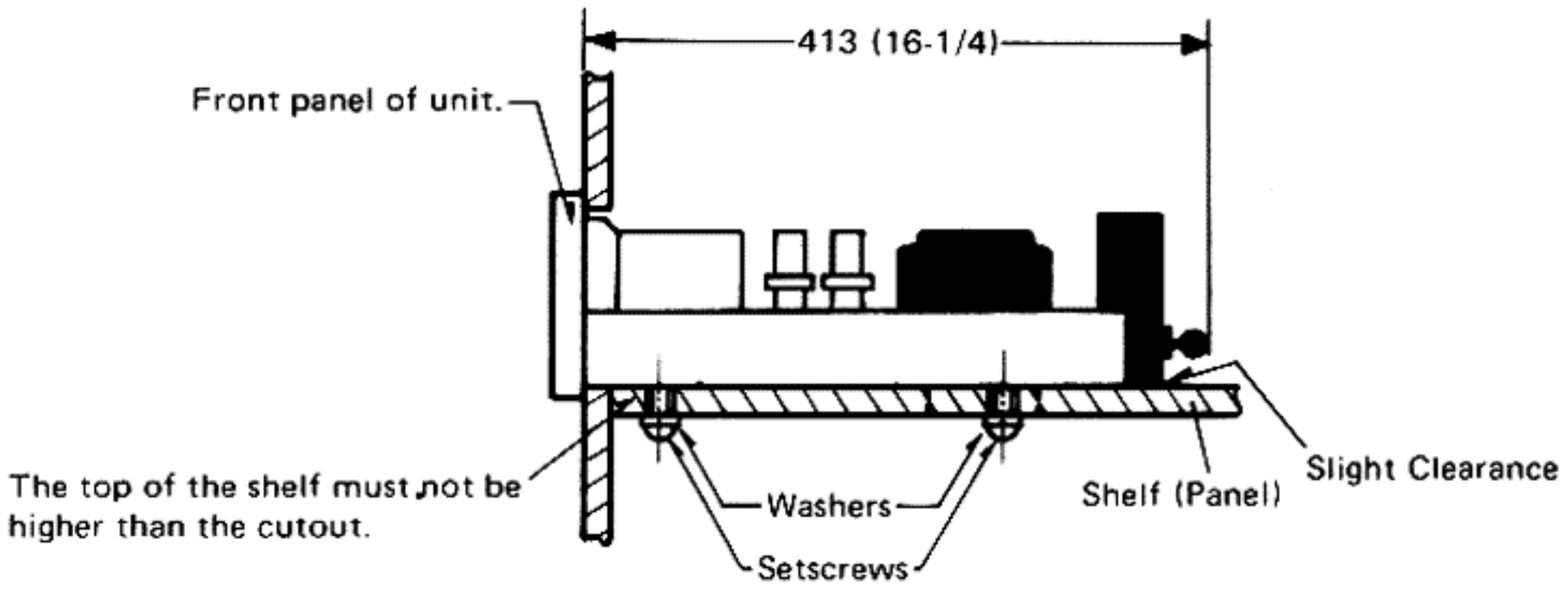
	SYMPTOM	SUSPECTED SOURCE OF NOISE	DIAGNOSIS AND REMEDY
	Power is not turned on although the power switch is set to ON.	· Fuse blows. (a) · Line plug is loose, (b)	Check (a) and (b) and correct the condition.
	In playing a record, increasing the volume causes howling.	· Distance between the turntable and the speakers is too short. · The place on which the turntable or speakers are set is unstable.	Change the distance or rearrange the installation increase of the unit and speakers. (Installing the turntable on a firm, solid stand may alleviate this problem.) Do not enhance the BASS sound level excessively.

MOUNTING TEMPLATE



UNIT: mm (inch)

Remove the four feet on the bottom plate of the unit.
After removing feet, fasten setscrews into holes from which feet were removed.



Use M4 (ISO) setscrews of within 10mm (1/3") long for combining amp's bottom plate with any panel, allowing a slight clearance.

SPECIFICATIONS

Semiconductors

FETs 3
ICs 4
Transistors 57
Diodes 39

Power Amplifier Section

70 watts* per channel, min. RMS at 8 ohms or 80 watts* per channel at 4 ohms from 20 Hertz to 20,000 Hertz, with no more than 0.3% total harmonic distortion.

Continuous Power Output at 1,000 Hertz
(Both channels driven) . . . . . 75 watts per channel (8 ohms)
100 watts per channel (4 ohms)
Total Harmonic Distortion (20 Hertz to 20,000 Hertz)
. . . . . No more than 0.3%
(Continuous Rated Power Output)
No more than 0.05%
(1 watt per channel Power Output, 8 ohms)
Intermodulation Distortion . . . . . No more than 0.3%
(Continuous Rated Power Output)
No more than 0.05%
(1 watt per channel Power Output, 8 ohms)
Frequency Response . . . . . 7 Hertz to 100,000 Hertz
Input Sensitivity/Impedance
POWER AMP IN . . . . . 1 V/50k ohms
Output Speaker . . . . . A, B, C, A+B, A+C, B+C
Headphone . . . . . Low impedance
Damping Factor (1,000 Hertz, 8 ohms). 45
Hum & Noise (IHF, short-circuited, A Network) 110dB

Preamplifier Section

Input Sensitivity/Impedance
PHONO 1 . . . . . 2.5mV/50kΩ
PHONO 2 . . . . . 2.5mV/50kΩ
PHONO Overload Level (rms/p-p). 250mV/700mV
MIC 2.0mV/50kΩ
AUX 150mV/70kΩ
TAPE PB 1, 2 . . . . . 150mV/70kΩ
TAPE PB 2 (DIN connector) 150mV/70kΩ
Output Level/Impedance
TAPE REC 1, 2 . . . . . 150mV
TAPE REC 2 (DIN connector). 30mV/80kΩ
PRE OUT 1V/1kΩ
Harmonic Distortion (20Hz~20kHz) . . . . . Less than 0.1%
Frequency Response
PHONO (RIAA equalization) . . . . . 30Hz~15kHz ±0.3dB
AUX, TAPE PB . . . . . 10Hz~40kHz $^{+0}_{-1}$ dB
Tone Control
BASS: MAIN . . . . . ±10dB (100Hz)
SUB . . . . . ±5dB (50Hz)
TREBLE: MAIN . . . . . ±10dB (10kHz)
SUB . . . . . ±5dB (20kHz)

*Measured pursuant to Federal Trade Commission's Trade Regulation rule on Power Output Claims for Amplifiers.

Filter
LOW Cut . . . . . –8dB (50Hz) 6dB/oct.
HIGH Cut . . . . . –9dB (10kHz) 6dB/oct.
Loudness Contour (Volume control set at
–40dB position) . . . . . +8dB (100Hz), +4dB (10kHz)
Hum & Noise (IHF, short-circuited A,Network)
PHONO . . . . . More than 70dB
MIC . . . . . More than 65dB
AUX, TAPE PB . . . . . More than 95dB
Muting . . . . . –20dB

FM Section

Usable Sensitivity (IHF) 1.8μV
Capture Ratio (IHF) 1.0dB
Selectivity (IHF) 80dB
Signal-to-Noise Ratio 70dB
Image Rejection (98MHz) 85dB
IF Rejection (98MHz) 100dB
Spurious Rejection 100dB
AM Suppression 55dB
Harmonic Distortion: MONO . . . . . Less than 0.2%
STEREO . . . . . Less than 0.4%
Frequency Response . . . . . 20Hz~15kHz $^{+0.2}_{-2.0}$ dB
50Hz~10kHz $^{+0.2}_{-0.5}$ dB
Stereo Separation: 1kHz . . . . . More than 40dB
50Hz~10kHz . . . . . More than 30dB
Sub Carrier Suppression 65dB
Antenna Input . . . . . 300Ω Balanced
75Ω Unbalanced
Muting . . . . . ON–OFF

AM Section

Sensitivity (IHF, Ferrite antenna) 300μV/m
(IHF, Ext. antenna) 15μV
Selectivity 40dB
Signal-to-Noise Ratio 50dB
Image Rejection 65dB
IF Rejection 85dB

Miscellaneous

Power Requirements . . . . . AC 120V 60Hz, 220V 50/60Hz
or 110, 120, 130, 220 and 240V (switchable) 50/60Hz
Power Consumption 470W
600W (Manufactured for England)
Dimensions . . . . . 520 (W) x 175 (H) x 420 (D) mm
20-1/2 x 6-7/8 x 16-9/16 in.
Weight: Without Package . . . . . 18.5kg (40 lb 11 oz)
With Package . . . . . 22.6kg (49 lb 12 oz)

Furnished Parts

FM T-type Antenna 1
Operating Instructions 1
Fuse 6A . . . . . 1 (5 line voltage model only)
Fuse 3A . . . . . 1 (5 line voltage model only)

NOTE:
Specifications and the design subject to possible modification without notice due to improvements.

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